PROC. BIOL. SOC. WASH.
91(3), 1978, pp. 724–730

A NEW SPECIES OF THE GENUS *SPHAEROMICOLA* (OSTRACODA: ENTOCYTHERIDAE: SPHAEROMICOLINAE) FROM TEXAS, WITH NOTES ON RELATIONSHIPS BETWEEN EUROPEAN AND NORTH AMERICAN SPECIES

C. W. Hart, Jr.

Abstract.—A new entocytherid ostracod species, *Sphaeromicola moria*, is described from Rambies Cave, Uvalde County, Texas. This ostracod, commensal on the isopod *Cirolanides texensis* Benedict, is the first member of the subfamily Sphaeromicolinae described from the United States. Danielopol's recently proposed division of the genus *Sphaeromicola* into two groups, typified by *S. cirolanae* in North America and *S. topsenti* in Europe, is discussed in light of two North American species unknown to Danielopol at the time of his writing.

Representatives of the entocytherid ostracod genus *Sphaeromicola* have been described from freshwater habitats in France, Italy, Yugoslavia, and Mexico. Hosts to these commensal organisms are isopods of the families Sphaeromatidae and Cirolanidae in Europe; isopods of the family Cirolanidae in North America.

The species described below (from Uvalde County, Texas) is the first *Sphaeromicola* known from the United States. Two others (*Sphaeromicola cirolanae* Rioja, 1951, and *Sphaeromicola coahuiltecae* Hobbs and Hobbs, 1973) are known from the Western Hemisphere, and are represented by specimens from 18 localities in the Mexican states of Nuevo Leon, San Luis Potosi, and Tamaulipas.

Figure 1 shows the Mexican and United States ranges of *S. cirolanae*, *S. coahuiltecae*, and *S. moria*, new species. Detailed locality data for the previously described species were given by Hobbs and Hobbs (1973) and by Hart and Hart (1974). They are not repeated here.

Sphaeromicola moria, new species
Figs. 2–7

Male.—Eye absent; no pigment spot. Shell (Fig. 2) of single available specimen elongate oval with ventral margin weakly concave in anterior one-third; 0.26 mm in length, 0.13 mm in height, greatest height near midlength. Submarginal setae present on posteroventral margin, absent elsewhere.

Copulatory complex (Fig. 4) with peniferum truncate, subtriangular in lateral aspect, and posteroventral part apparently bilobed. Spermatic duct terminating in poorly developed penis situated at base of, and between posteroventral peniferal lobes. Clasping apparatus C-shaped, tapering dis-

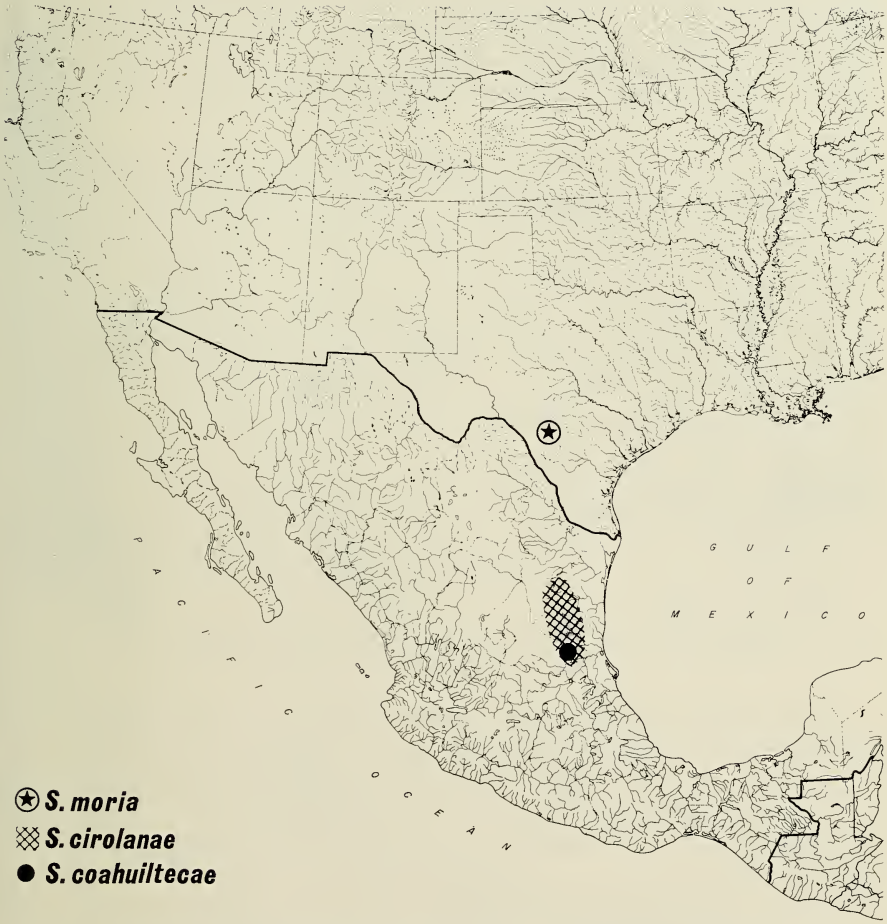


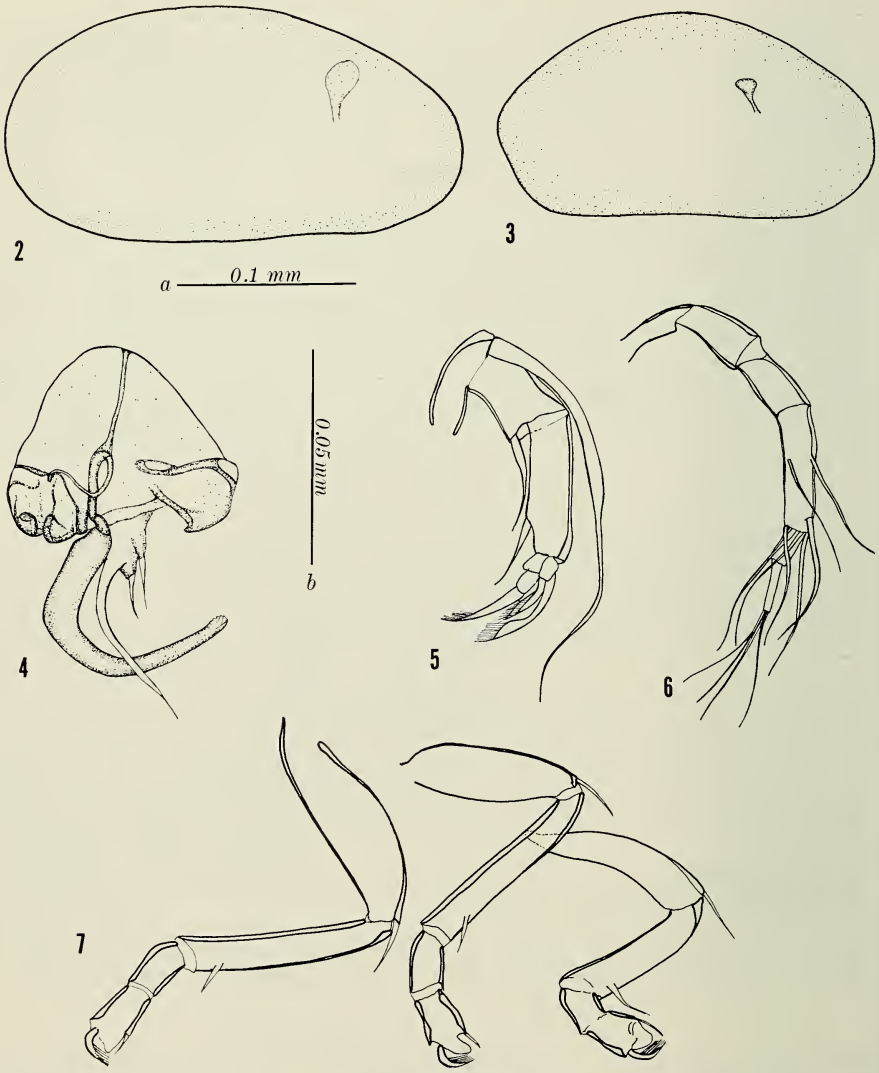
Fig. 1. Distributions of *Sphaeromicola cirolanae*, S. *coahuiltecae*, and S. *moria*.

tally, and terminating in 5 denticles; margins entire. Dorsal finger bifid and slender, ventral finger (flagellum) gently curved in proximal half and extending beyond ventral margin of clasping apparatus.

Antennule (Fig. 6) with segments 4 and 5 fused, segment 5 bearing 5 terminal setae. Segments 3 and 4 of antennal endopodite fused (Fig. 5).

Female.—Eye, as in male, absent (no pigment spot). Shell of single specimen (Fig. 3) similar to that of male, but slightly more vaulted at mid-length and with posterior margin not evenly rounded; 0.21 mm in length, 0.12 mm in height. Submarginal setae lacking.

The male and female specimens described above were taken from the same isopod collection, but were not found copulating. Hence there is



Figs. 2–7. S. *moria*: 2, Right valve of male holotype (because of absence of eye spot, the antennal gland is depicted for purposes of orientation); 3, Right valve of female allotype; 4, Copulatory complex; 5, Antenna; 6, Antennule; 7, Thoracic legs.

a possibility that the female does not belong to the same species as the male. Because of the absence of other male ostracods in the collection, however, it was assumed that the two are members of the same species.

Type-locality and host.—Rambies Cave, 2 miles north of Uvalde, Uvalde

County, Texas, the only known locality for the species. The specimens on which the above description is based were found by Thomas E. Bowman on isopods collected by Dale Pate and Charles Yates, 4–5 September 1976, and which were donated to the Smithsonian Institution by James Reddell. The host isopod is *Cirolanides texensis* Benedict (Accession No. 325058).

Disposition and types.—The holotypic male and presumptive allotypic female are deposited in the National Museum of Natural History, Smithsonian Institution, USNM catalog numbers 170898 and 170899, respectively.

Relationships.—*Sphaeromicola moria* has its closest affinities with the Mexican *S. cirolanae*, but only the males of the two can be readily distinguished from one another. In *S. cirolanae* a distinct tooth is present on the internal border of the clasping apparatus, and the penis is developed as a distinct structural entity. In *S. moria*, no tooth is present on the internal margin of the clasping apparatus and the penis is poorly developed.

Name.—From the Elvish word *Moria* (the Black-pit), a name for the vast underground city of the Dwarves (See J. R. R. Tolkein's *The Lord of the Rings*). Used here because this ostracod, as well as most other members of its genus, are known only from cave habitats.

Key to the Subfamilies of Entocytheridae
(From Hart and Hart, 1974)

1	Dorsal claw of antenna without setae on flexor surface (commensal on crayfishes and phreatoicoid isopods)	Notocytherinae
1′	Dorsal claw of antenna with setae on flexor surface	2
2(1′)	Maxilla with respiratory plate and well developed masticatory lobes; penis usually strongly curved (commensal on crayfishes and a species of freshwater crab)	Entocytherinae
2′	Maxilla without respiratory plate or masticatory lobes (occasionally vestigial); penis straight or only slightly curved	3
3(2′)	Antennule consisting of five podomeres; distal flexor margin of ultimate podomeres of legs with brush of setae on finger-like projection opposing terminal claw (commensal on wood-boring isopods)	Microsyssitrinae
3′	Antennule consisting of six or seven podomeres; distal flexor margin of ultimate podomeres of legs lacking setiferous finger-like projection opposing terminal claw	4
4(3′)	Clasping apparatus with terminal denticles (commensal on freshwater isopods)	Sphaeromicolinae
4′	Clasping apparatus without terminal denticles (commensal on marine amphipods)	Hartiellinae

Key to the North American Species of *Sphaeromicola*

1 Clasping apparatus with distinct tooth on internal border of horizontal ramus *Sphaeromicola cirolanae*
1′ Clasping apparatus with no tooth on internal border of horizontal ramus 2
2 Horizontal ramus of clasping apparatus sinuous *Sphaeromicola coahuiltecae*
2′ Horizontal ramus of clasping apparatus not sinuous, but curving gently dorsally *Sphaeromicola moria*

Differences Between the European and North American Members of the Genus *Sphaeromicola*

Danielopol (1977) recently described a new subspecies of *Sphaeromicola* (*S. cebennica juberthiei*) from southern France, reviewed the world distribution of the family Entocytheridae, and discussed the affinities of and differences between the European and North American (Mexican) members of the genus *Sphaeromicola.*

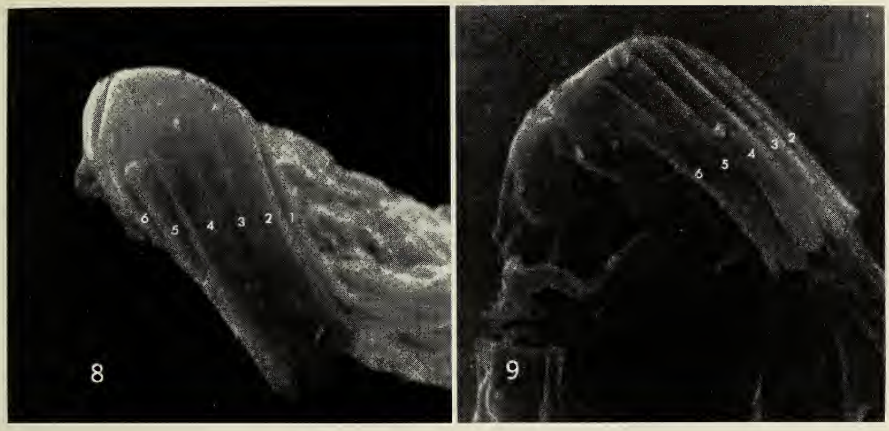
Based on the one North American species known to him at the time (*S. cirolanae*), he proposed that the genus *Sphaeromicola* be divided into two groups: the *cirolanae* group in North America and the *topsenti* group in Europe. He based the division on the following criteria:

cirolanae group	*topsenti group*
1. Segments 4 and 5 of antennule fused; segment 5 bearing 5 terminal setae.	Segments 4 and 5 of antennule not fused; segment 5 bearing 4 terminal setae.
2. Segments 2 and 3 of antennal endopodite fused.[1]	Segments 2 and 3 of antennal endopodite not fused.[1]
3. Terminal claws of thoracic legs bearing 4 teeth.	Terminal claws of thoracic legs bearing 5–8 teeth.

Criteria 1 and 2 appear to hold for *S. coahuiltecae* and *S. moria* as well as for *S. cirolanae.* However, the third criterion (number of teeth on terminal claws of thoracic legs) does not appear to be valid.

Danielopol states that the terminal thoracic leg claws of *S. cirolanae* bear 4 teeth; those of the European *topsenti* group, 5–8 teeth. My observations, however, indicate that the three North American *Sphaeromicola* species all possess six teeth on the terminal claws of the thoracic legs.

It should be recognized that, because of their small size ($< 1\ \mu$ wide; $< 0.5\ \mu$ thick) and usual clustered orientation on slides prepared for examination by conventional light transmission microscopy, the claws are extremely difficult to resolve. Examination by standard light transmission and phase



Figs. 8 and 9. Ventral SEM views of thoracic leg terminal claws of *S. cirolanae*, showing presence of 6 teeth. Tooth 6 is obscured by tooth 5 (identified by artifact at base) in Fig. 8, but is readily identifiable in Fig. 9 (in which tooth 1 is obscured). Specimens used in making these photographs were collected from Grutas de Quintero, 13 km SW of Mante, Tamaulipas, Mexico, 5 January 1970, by S. Wiley and J. Cooke (USNM Accession No. 308026).

contrast microscopes yield equivocal results, but the claws can be accurately counted by using a microscope equipped with Nomarski differential interference contrast (DIC) condensers.

Slide mounted specimens of *S. cirolanae*, *S. coahuiltecae*, and *S. moria* were examined with Nomarski DIC equipment, and six teeth were found on the terminal thoracic leg claws of each.

Enough specimens of *S. cirolanae* were available to prepare a number of them for examination by scanning electron microscopy (SEM). The resulting photographs (Figs. 8 and 9) clearly show the presence of six claw teeth, and also illustrate why the teeth are so difficult to count by conventional microscopy.

Even with the SEM, the entire complement of teeth can only be seen by tilting the specimen so that the claw can be seen from different angles. Thus, Fig. 8 is a ventral view of the terminal claw of a leg with the mesial face to the right; Fig. 9 is the same claw from a different angle, showing a sixth tooth tucked slightly under the others on the external face. The artifact at the base of the fifth tooth serves as a reference point by which to count the teeth.

Literature Cited

Danielopol, Dan L. 1977. Recherches sur les ostracodes Entocytheridae. Données sur *Sphaeromicola cebennica juberthiei* nov. ssp. et *Sphaeromicola cirolanae* Rioja. International Journal of Speleology 9:21–41.

Hart, C. W., Jr., N. Balakrishnan Nair, and Dabney G. Hart. 1967. A new ostracod (Ostracoda: Entocytheridae) commensal on a wood-boring marine isopod from India. Notulae Naturae, Academy of Natural Sciences of Philadelphia, No. 409:1–11.

Hart, Dabney G., and C. W. Hart, Jr. 1974. The ostracod family Entocytheridae. The Academy of Natural Sciences of Philadelphia, Monograph 18. 239 pp.

Hobbs, Horton H., Jr. and H. H. Hobbs III. 1973. The genus *Sphaeromicola* (Ostracoda, Entocytheridae) in Mexico. Association for Mexican Cave Studies, Bulletin 5, Speleo Press, Austin, Texas. Pp. 39–42.

Rioja, Enrique. 1951. Estudios carcinologicos. XXV. El hallazgo del genero *Sphaeromicola* en America (Ostracodos, Citeridos) y descripcion de una nueva especie. Anales del Instituto de Biologia, Mexico, 22(1):169–179, 16 figs.

National Museum of Natural History, Smithsonian Institution, Washington, D.C. 20560.

Footnote

[1] It should be noted that Danielopol's interpretation of the numbers of segments in the antenna differs from the interpretations of other workers. It is thought by others that Danielopol's 1st antennal segment (Danielopol 1977: fig. 10B) is actually the 2nd antennal segment, the 1st (basal) segment being devoid of setae but bearing an exopodite, or "flagellum," on its distal extensor margin that extends for a distance subequal to the remainder of the antenna (Hart, Nair, and Hart, 1967; Rioja, 1951: Plate 1, fig. 4). According to this interpretation, Danielopol's segments 2 and 3 should be considered segments 3 and 4.